

PATENT

Application # 09/851,284

Attorney Docket # 1999-0647 (1014-131)

AMENDMENTS

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method of managing data flow in a router in a network, comprising:

determining that a data packet from a plurality of data packets is eligible for overflow routing based upon a network policy and at least one of a source port ID, a source IP address, and a an intended destination address, wherein not all data packets from the plurality of data packets are eligible for overflow routing; and

switching, upon detection of congestion on one of a plurality of output ports of the router, ~~output of the eligible data packet from a primary output path of the one of the output ports~~ corresponding to a destination address of the eligible data packet, to an overflow path for the destination address of the eligible data packet, said switching based upon congestion occurring only within the router.

2. (Currently Amended) The method according to claim 1, further comprising:

detecting when the congestion has abated; and

switching ~~the output of data packets corresponding to the destination address of the eligible data packet~~ from the overflow path back to the primary output path for corresponding to the destination address.

3. (Currently Amended) The method according to claim 1, further comprising:

storing a forwarding table in the router, the forwarding table having ~~entries~~ an entry respectively corresponding to the destination addresses ~~address in the network~~ and identifying at least two output paths from the router for ~~at least some one of the destination addresses~~ address to enable overflow routing, one of the at least two output paths being identified as a primary

PATENT

Application # 09/851,284

Attorney Docket # 1999-0647 (1014-131)

path and ~~other all remaining output paths of the at least two~~ output paths being identified as overflow paths.

4. (Currently Amended) The method according to claim 3, further comprising:

determining, upon detection of congestion on the one of the plurality of output ports, on which ~~one of the at least two~~ overflow paths ~~from which to output switch the~~ the eligible data packet based upon an amount of data packets currently assigned to be output ~~from on~~ each of the ~~at least two~~ overflow paths.

5. (Currently Amended) The method according to claim 4, ~~wherein the determining step comprises~~ further comprising:

determining ~~the an~~ amount of data packets currently assigned to be output ~~from on~~ each of the ~~at least two output overflow~~ paths;

determining ~~which one of the at least two~~ a selected overflow path from the overflow paths, the selected overflow path has the assigned a least amount of the amount of data packets currently assigned to be output on each of the overflow paths; and

assigning the eligible data packet to ~~be output from the at least one of the selected~~ overflow ~~paths having the least amount of data to be output~~ path.

6. (Currently Amended) A method of managing data flow in a router in a network, wherein the router includes a forwarding table having entries respectively corresponding to destination addresses in the network and identifying ~~at least two a~~ plurality of output paths from the router for at least ~~someone~~ of the destination addresses to enable overflow routing, one of the plurality of at least two output paths being identified as a primary path and ~~other all remaining output paths of the plurality of~~ output paths being identified as ~~an~~ overflow paths, the method comprising:

PATENT

Application # 09/851,284

Attorney Docket # 1999-0647 (1014-131)

monitoring receipt of ~~a congestion signal~~ signal indicative of congestion from at least two transmit buffers respectively associated with ~~at least two an~~ an output ~~ports~~ port of the router;

determining that a destination address from the destination addresses in the network is eligible for overflow routing based upon a network policy and at least one of a source port ID, a source IP address, and an intended destination address, wherein not all of the destination addresses in the network are eligible for overflow routing; and

switching, for all ~~of the~~ destination addresses in the forwarding table affected by the ~~detection of congestion~~ and eligible for overflow routing, from the primary path to a selected one of the plurality of overflow paths for transmitting the data, said switching based upon congestion occurring only within the router.

7. (Currently Amended) The method according to claim 6, further comprising:

determining when the congestion has abated based upon status of the congestion signals;

switching, for all ~~of the~~ destination addresses in the forwarding table switched to overflow routing, from the selected overflow path back to the primary path when the congestion has abated.

8. (Currently Amended) A method of managing data flow in a router in a network, comprising:

storing a forwarding table in the router, the forwarding table having entries respectively corresponding to destination addresses in the network and identifying a plurality of at least two output paths from the router for at least ~~some one~~ one of the destination address to enable overflow routing, one of the plurality of at least two output paths being identified as a primary path and ~~any other each remaining output path of the plurality of output path-paths~~ being identified as an overflow path;

monitoring receipt of congestion signals indicative of congestion from at least two ~~transmit buffers respectively~~ associated with ~~at least two an~~ an output ~~ports~~ port of the router;

PATENT

Application # 09/851,284

Attorney Docket # 1999-0647 (1014-131)

determining that a destination address from the destination addresses in the network is eligible for overflow routing based upon a network policy and at least one of a source port ID, a source IP address, and an intended destination address, wherein not all of the destination addresses in the network are eligible for overflow routing; and

~~switching, for all of the destination addresses in the forwarding table affected by the detection of congestion and eligible for overflow routing, data packets associated with the determined destination address from the primary path to the a selected overflow path from the plurality of overflow paths for transmitting the data, said switching based upon congestion occurring only within the router.~~

9. (Currently Amended) The method according to claim 8, further comprising:

determining when ~~the congestion occurring within the router~~ has abated based upon status of the congestion signals; and

~~switching, for all of the destination addresses in the forwarding table switched to overflow routing, data packets associated with the determined destination address from the selected overflow path back to the primary path when the congestion occurring within the router has abated.~~

10. (Currently Amended) A method of managing data flow in a router of a network, comprising:

running a routing protocol in the router;

determining ~~at least two a plurality of~~ output paths for each of a plurality of destination addresses based upon the routing protocol, one of the plurality of output paths identified as a primary output path, each remaining output path of the plurality of output paths identified as an overflow path;

determining ~~which of~~ eligible destination addresses from the plurality of destination addresses are eligible for overflow routing based upon a network policy and at least one of a

PATENT

Application # 09/851,284

Attorney Docket # 1999-0647 (1014-131)

source port ID, a source IP address, and a an intended destination address, wherein not all destination addresses are eligible for overflow routing; ~~and~~

storing, for each of the eligible destination addresses ~~eligible for overflow routing~~, the at least two plurality of output paths; ~~and~~

switching eligible data packets associated with one of the eligible destination addresses from the primary output path to a selected overflow path, said switching based upon congestion occurring only within the router.

11. (Currently Amended) The method according to claim 10, wherein the storing step comprises:

storing, for each of the destination addresses other than the eligible destination addresses ~~eligible for overflow routing~~, one determined output path of the plurality of output paths.

12. (Currently Amended) The method according to claim 10, further comprising:

monitoring congestion status on each output port of the router; ~~and~~

~~switching, upon detection of congestion on one of the output ports, output of data from a primary output path of the one of the output ports corresponding to a destination address of the data to be output to an overflow path for the destination address; and~~

detecting congestion occurring only within the router.

13. (Currently Amended) The method according to claim 12, further comprising:

detecting when the congestion occurring only within the router has abated; and

switching the ~~output of data~~ packets associated with the destination address of the eligible data packets from the selected overflow path back to the primary output path ~~for the destination address.~~

14. (Currently Amended) A method of managing data flow in a router in a network, comprising:

PATENT

Application # 09/851,284

Attorney Docket # 1999-0647 (1014-131)

monitoring a congestion status level on each output port of the router, ~~wherein the congestion status is one of a plurality of levels of congestion;~~

determining that predetermined data packets are eligible for overflow routing based upon a network policy and at least one of a source port ID, a source IP address, and an intended destination address, wherein not all data packets are eligible for overflow routing;

determining an amount of the predetermined data packets to be overflowed based upon the a predetermined level of congestion; and

switching, upon detection of ~~the one of the plurality of levels of at least the~~ predetermined level of congestion on ~~the~~ at least one output port, the amount of predetermined data packets to be overflowed from a primary output path to an overflow path of the at least one output port corresponding to a destination address of the data to be output, to an overflow path for the destination address, said switching based upon congestion occurring only within the router.

15. (Currently Amended) The method according to claim 14, further comprising:

detecting when the level of congestion occurring only within the router has abated; and

switching ~~the output of the at least one output port~~ data packets associated with a predetermined destination address of the predetermined data packets from the overflow path back to the primary path for the predetermined destination address.

16. (Currently Amended) The method according to claim 14, further comprising:

storing a forwarding table in the router, the forwarding table having entries respectively corresponding to destination addresses in the network and identifying at least two output paths from the router for at least someone of the destination addresses to enable overflow routing; ~~and~~

~~storing, for each of the at least someone of the destination addresses, a plurality of overflow data amounts respectively corresponding to the plurality of levels of congestion.~~

PATENT**Application # 09/851,284****Attorney Docket # 1999-0647 (1014-131)**

17. (Currently Amended) The method of claim 11, further comprising:

collecting link state advertisements from other routers in the network, wherein the link state advertisements are adapted for use in ~~the said~~ determining at least two corresponding outlet paths step; and

constructing a graph in the router using the link state advertisements.

18. (Currently Amended) The method of claim 10, further comprising:

prioritizing the at least two corresponding output paths based on possible IP packet priorities.

19. (Currently Amended) The method of claim 10, further comprising:

encapsulating an IP packet according to an MPLS protocol, the IP packet adapted to be routed on one of the at least two corresponding output paths.

20. (Currently Amended) The method of claim 10, wherein said determining the at least two

corresponding output paths step uses a K-diverse shortest path algorithm.